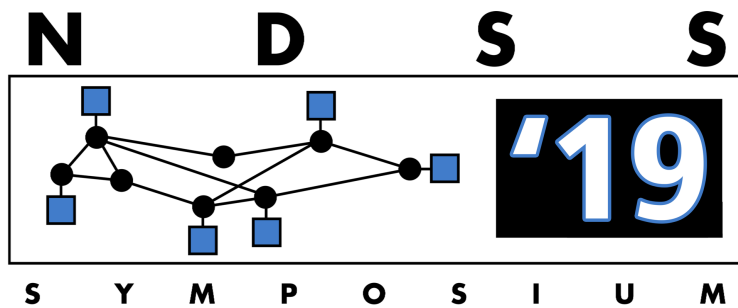


Proceedings

2019

# Network and Distributed System Security Symposium



Proceedings

**2019**

**Network and Distributed  
System Security Symposium**

February 24 - 27, 2019

San Diego, California

*Hosted by the*  
**Internet Society**





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**Internet Society**  
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Address your correspondence to: NDSS Program Manager, Internet Society, 1775 Wiehle Avenue, Suite 201, Reston, Virginia 20190-5108, U.S.A., tel. +1 703 439 2120, fax +1 703 326 9881, [ndss@isoc.org](mailto:ndss@isoc.org).

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**Internet Society**  
1775 Wiehle Avenue  
Suite 201  
Reston, VA 20190-5108  
tel +1 703.439.2120  
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# General Chair's Message

It is my pleasure to welcome you to the 2019 Network and Distributed System Security (NDSS) Symposium.

NDSS 2019 continues its growth with its largest program ever: the most technical papers in its history, four workshops, an exciting keynote, and poster session.

This year we have five co-located workshops: Workshop on Binary Analysis Research (BAR), Workshop on Decentralized IoT Systems and Security (DISS), Workshop on Measurements, Attacks, and Defenses for the Web (MADWeb), and Workshop on Usable Security and Privacy (USEC). The workshops encompass critical topics in network and distributed systems security, some established at NDSS (BAR, DISS, and USEC) and one new one this year (MADWeb). I'd like to thank Mathias Payer and Giulia Fanti, the Workshops Co-Chairs, and Karen O'Donoghue, Steering Group Co-Chair, for bringing together such an exciting set of workshops.

Building on recent successes, this year we're continuing the tradition of organizing a poster session to showcase both in-progress and exciting recent work in various aspects of computer security. Thanks are due to Adam Aviv and Gang Tan, the Poster Co-Chairs, for making sure we have an excellent poster program.

Due to increased interest in our field and in NDSS, we have seen another record number of papers submitted to NDSS – nearly 100 more than the previous record – but even better, we have had a significant increase in the papers accepted – over 25% more than the previous record. As a result, many exciting papers on a wide range of computer security topics will be presented at NDSS this year. Selecting the papers is a task that involves many people and many hours of hard work. I'd like to thank Program Committee Co-Chairs Alina Oprea and Dongyan Xu for the tremendous amount of work they donated and the excellent job they've done in putting together this year's program.

New this year is the first NDSS Test-of-Time Award highlighting the NDSS papers identified as having the greatest scientific and/or practical impact that were published prior to 2009. I want to thank the Time-of-Time Award committee for their work efforts, including the current Program Committee Co-Chairs, Alina Oprea and Dongyan Xu, along with David Balenson, Z. Morley Mao, and Paul Syverson.

Many individuals have contributed to making NDSS a success, including everyone on the Steering Group, Organizing Committee, and the Internet Society and Association Management Solutions staff. I'd like to thank all of them for contributing their time and effort.

NDSS is possible in large part thanks to our generous sponsors. I'd like to thank Baidu, Check Point Software Technologies, Cisco, Google, and Qualcomm. I also thank the Internet Society additionally for hosting the symposium and providing funds for our student grants.

Finally, thank you for participating in the symposium and contributing to making NDSS a success. I wish you all an excellent NDSS 2019!

**Trent Jaeger**  
**General Chair, NDSS 2019**

## **Program Co-Chairs' Message**

It is our great pleasure to present to you the technical program of the 26th Annual Network and Distributed System Security Symposium (NDSS 2019), held at the Catamaran Resort Hotel and Spa in San Diego, CA, USA on February 24-27, 2019. For the past 26 years NDSS has established itself as one of the top conferences in systems and network security. Papers published at NDSS have made significant impact on research and practice, as exemplified by the inaugural awardees of the NDSS Test-of-Time Award. Our goal continues to be “impact”, especially in the form of novel and practical solutions and techniques in cyber security. We hope that the papers in this year’s program reflect the same strong potential in securing real-world networks and systems.

This year we received a record of 521 complete submissions (i.e., not counting papers that clearly violated the submission guidelines). Submissions were evaluated on the basis of their technical quality, novelty, and significance. Multiple rounds of reviewing culminated in a one-day in-person program committee meeting in Boston, MA on November 2, 2018. At the end of the meeting 89 papers (17% acceptance rate) were selected to appear in the program, the largest in NDSS history. We strove to make the review process a competitive but constructive one. Program Committee (PC) members were regularly reminded to identify positive points in a submission and provide concrete suggestions to improve each paper. For each author rebuttal, we required that the corresponding reviews be updated to respond to the rebuttal. Continuing last year’s practice, we appointed a Review Task Force (RTF) to help enforce the quality, timeliness, and responsiveness of the review process.

Organizing a conference as large as NDSS is a substantial endeavor, and we would like to extend our sincere thanks to everyone who contributed her or his time and effort. We would like to specifically thank a few individuals who made particular contributions to NDSS 2019. General Chair Trent Jaeger oversaw the entire conference and worked closely with us for Keynote Speaker invitation and Test-of-Time Award nomination (he chaired the Award Committee). Karen O'Donoghue served as a critical interface between the Program Co-Chairs, the Organizing Committee and ISOC. Publicity Chair Adam Bates worked seamlessly with us to solicit submissions and promote the conference. Publications Chair David Balenson took good care of the proceedings production matters. We continued our single day, dual-track PC meeting experiment this year with great success. Alina Oprea and several Northeastern PhD students (Ahmet Buyukkayhan, Matthew Jagielski, Talha Ongun, and Giorgio Severi) hosted the PC meeting at Northeastern University in Boston, and were largely responsible for the very smooth and productive meeting. We would also like to thank the Northeastern Events team and Aanjhan Ranganathan for their assistance on the ground during the PC meeting, and Yan Ji (Cornell Tech) for creating a scheduling tool for the meeting.

Last but not least, we would like to thank our PC members who have contributed significant time and effort to the creation of the technical program. It has been our privilege working with them. Finally, we thank all authors who submitted to NDSS 2019 and all attendees who are here at NDSS 2019, without whom NDSS would not be possible. Enjoy the conference!

**Alina Oprea and Dongyan Xu**  
**Program Co-Chairs, NDSS 2019**

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